DIGITAL EQUIPMENT CORPORATION

Products and Services

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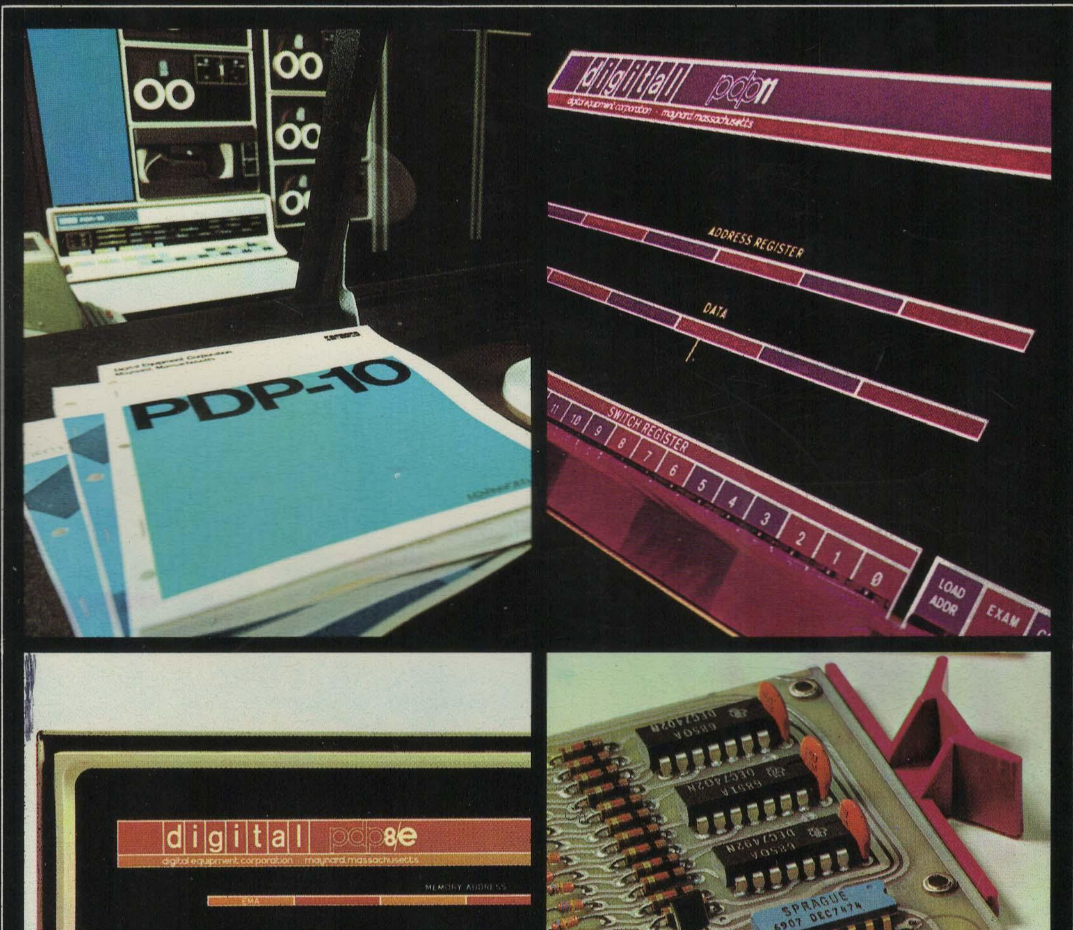

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PRODUCTS AND SERVICES EUROPE

Computers and related equipment are now used extensively in engineering, research, industrial control, education, and biomedicine. This equipment must be: economical; capable of real-time data acquisition and control; adaptable to the scientific process; and easy to connect concurrently to different devices. It is for these applications that Digital produces a wide range of equipment: small, medium, and large computers, circuit modules, peripherals, accessories, and software.

All these applications have one common need: low price/high performance. Powerful, state-of-the-art equipment at low prices is uniquely available from Digital for two major reasons. Digital has consistently spent more than ten percent of nett sales on research and development and is a world leader in automated mass production, particularly in the module and small computer areas. 5,5 million pounds alone were spent on R and D in 1970. Manufacturing space exceeds 1.5 million square feet, and over two hundred computers are used in the manufacturing process.

Digital is a dynamic mixture of conservative engineering management, rapid growth, and considerable size. Digital is among the largest computer manufacturers (more than 11,000 installations at the beginning of 1971, with 2,120 in Europe) and is the largest manufacturing supplier of circuit modules with a production of more than 3 million per year. European sales have grown at a rate of between 40 to 65 percent per year since inception in 1965. Yet some feel management is too conservative, charging all costs of development programmes against current operations and not expanding until we have the personnel and management to handle the expansion. We feel this approach promotes stability.

Digital takes a slightly different approach to its customers and we are quite proud of the friendly rapport we attain with the people we serve. Digital people are well trained engineers who like to help the customer solve his own problem. First they offer comprehensive literature in the form of Digital's well known handbooks which cover a wide range of subjects. Then they provide training courses (regularly scheduled in the U.K., France, and Germany) accompanied by in-depth documentation. Following up are well trained support people, both software specialists and hardware field engineers. Digital has over 250 European service and support people in the field.

Digital also offers DECUS, the world's most active users group. DECUS reinforces customer expertise through meetings, seminars, technical publications, and program exchange.

Digital serves Europe through 15 offices in the United Kingdom, Scandinavia, the Netherlands, Belgium, Germany, France, Switzerland, and Italy; production in the U.K. at Reading; and its European Headquarters in Geneva. The products and services of Digital Equipment Corporation are described in the following pages.

pdp-8/e

The PDP-8/e is a major step forward in Digital's small computer product line. It is the all new, lower cost successor to the popular PDP-8/I and PDP-8/L*, and is the result of the largest concentration of minicomputer engineering, programming, and user expertise in the world. Applications have increased to embrace almost every discipline known to man and new applications are finding their way to the PDP-8 family every day. Representative categories of these computer applications include data communications, biomedicine, industry, engineering, aerospace, physics, chemistry, and business.

The 12-bit PDP-8/e offers features such as a unique internal bus system called OMNIBUS™, which allows the user to plug memory and processor options into any available slot location. The PDP-8/e also offers the availability of 256 words of READ/ONLY or READ/WRITE memory; a 1.2 microsecond memory cycle time; the use of TTL integrated circuitry with MSI technology; expansion to 32,768 12-bit words of core storage; low cost mass storage expansion with DECdisk or DECtape; and a space and money saving package design.

Speed and ease of operation at low cost are the promises the PDP-8/e makes and fulfils. The OMNIBUS eliminates the need for back panel wiring, and as stated, processor options can be inserted in any available slot. PDP-8/e software is easy to learn and use, thanks to extensive documentation, and experienced programmers will find that PDP-8/e software incorporates many advanced features previously unavailable on any small machine. Over 60 options and peripherals are available now on the PDP-8/e.

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* More than 10,000 PDP-8, 8/S, 8/I and 8/L systems are installed throughout the world (1600 in Europe), making this the largest family in the minicomputer industry.

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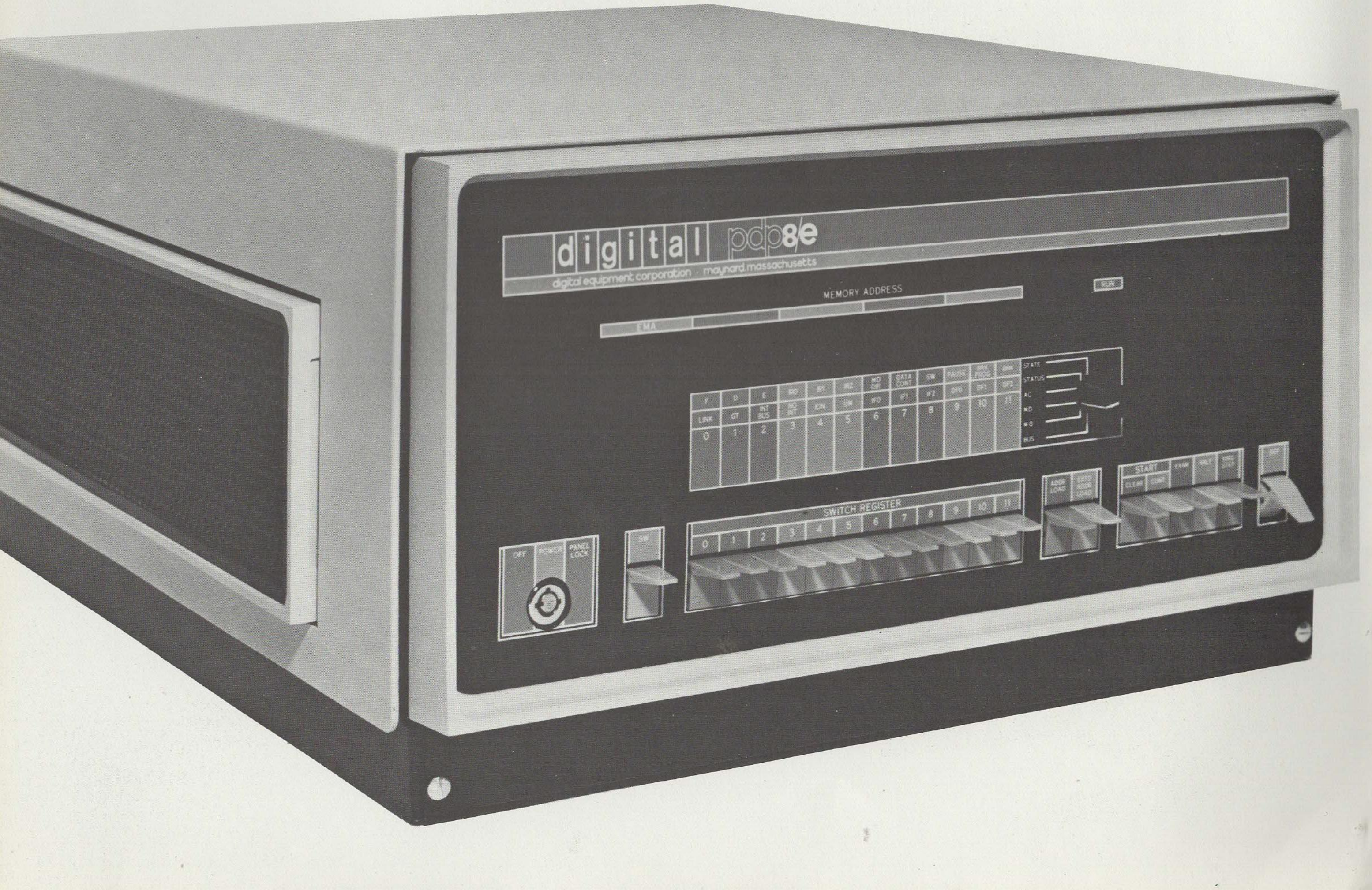

pdp-11

The PDP-11 is Digital's first 16-bit small computer. It is an extremely fast and powerful machine enhanced by a wide range of peripherals including DECtape, disks, line printers, card equipment, analogue and digital converters, and many others.

The PDP-11 is used extensively in applications that require an extremely fast and powerful 16-bit system with unique modularity. Examples include data communications, industrial control, engineering, education, and biomedicine.

The PDP-11's hardware design features a radically new concept called UNIBUS™, a high speed, bi-directional data path to which all computer components are interfaced. UNIBUS permits ease of maintenance, tailoring of the computer to specific needs, such as adding memories of different speeds, and allows simultaneous tasks and peripheral interaction without use of the central processor.

Other features include four levels of vectored priority interrupts allowing an infinite number of devices to be assigned at each level.

Eight general registers provide program-accessible devices that can be used as accumulators, pointers to memory locations, or full word index registers.

Double-operand addressing and over 400 useful instructions simplify programming and allow the programmer to do more with less memory.

pdp-12

The PDP-12 is the faster, more powerful, yet less expensive successor to the LINC-8 and LINC, the first small, laboratory oriented computers with built-in interactive graphics capability.

Performance characteristics of the PDP-12 have been optimised around a complete hardware/software system. The PDP-12 features a cathode ray tube display (17.5 x 22.5 cm) with graphic and alphanumeric capability; automatic program loading from magnetic tape; and program debugging hardware. A new floating-point processor is available that gives the PDP-12 a multiprocessor capability and does calculations up to 100 times faster.

The PDP-12 system concept works to the advantage of users at all levels of programming sophistication. Interactive software greatly facilitates program development in FORTRAN, BASIC, FOCAL (conversational language developed by Digital), or in conventional machine language.

The hands-on, interactive concept of the PDP-12 together with an inexpensive range of peripherals makes it well-suited for computer-extended instruction both in universities and at other educational levels.

This computer is ideal for applications such as psychological and physiological research, medicine, and physical chemistry (control and data analysis from analytical instruments such as mass spectrometers, NMR, and gas chromatographs).

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pdp-15

For larger and more complex data handling tasks, Digital has developed five medium-scale, 18-bit PDP-15 systems. These systems all have two independent processors (one for arithmetic operations and the other for I/O transfers) which greatly enhance their efficiency.

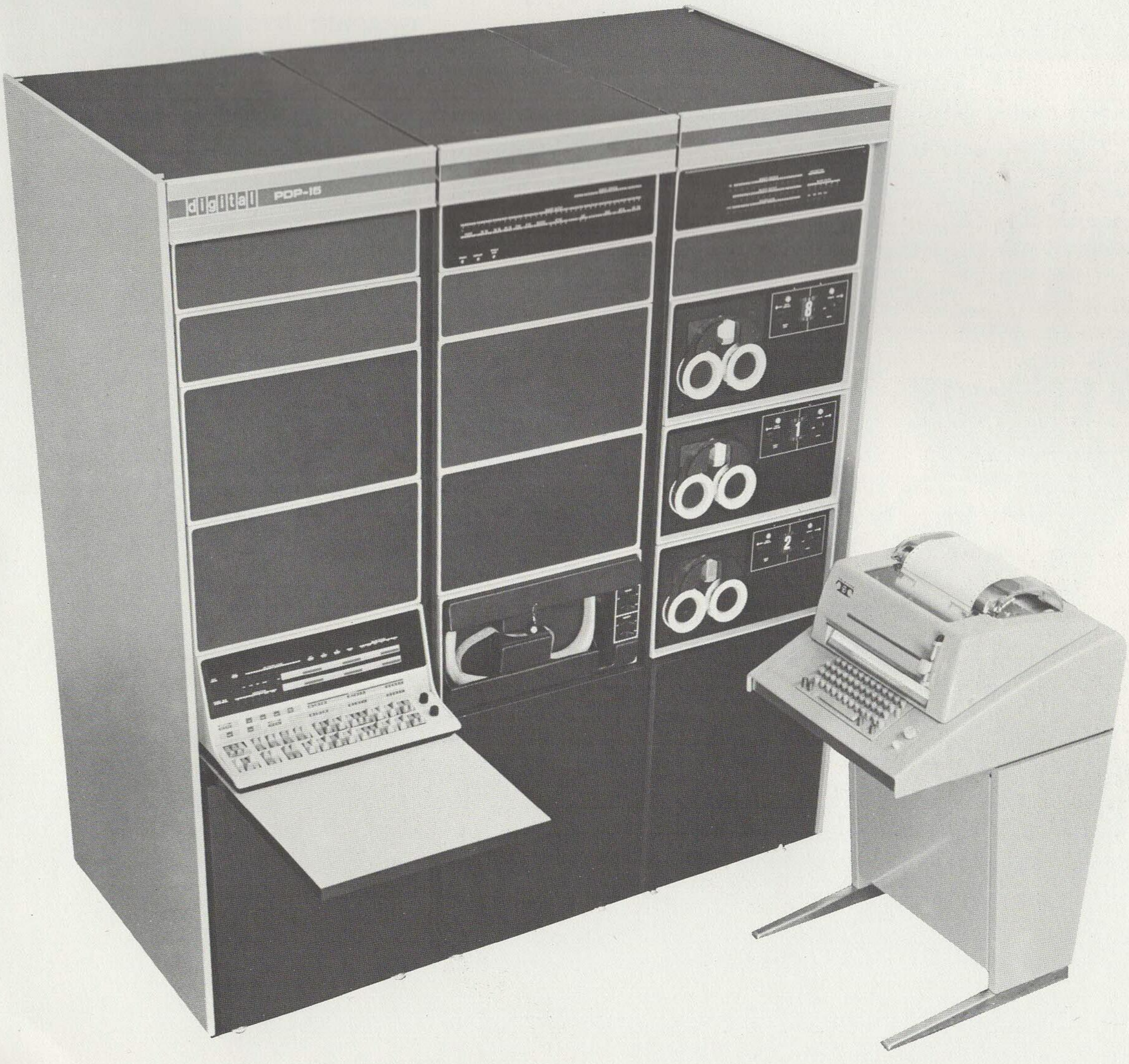
The PDP-15/10 is a basic system designed to let new users with limited budgets plan for later expansion.

The PDP-15/20 is designed for research and engineering environments where real-time data acquisition and control tasks are combined with program development and testing.

PDP-15/30 is oriented toward research, engineering, and industrial environments where one or more real-time tasks typically require continuous responsiveness from the computer. Unused capacity can be devoted to other tasks.

PDP-15/40 is designed for industrial and engineering environments where the need for a background/foreground mode of operation is compounded by the necessity of large random-access files.

A new system, PDP-15/35, has been designed to operate with the RSX Real-Time System Executive. The RSX Executive is ideal for multi-task, dynamic real-time applications which require task scheduling and concurrent servicing of several I/O devices. Typical applications for the RSX include industrial/process control systems, large scale data acquisition and control, biomedical research, and analytical chemistry.



COMPUTER-BASED SYSTEMS

IDAC-8 A real-time system for acquiring and monitoring data instantaneously. In manufacturing operations it can be used for assembly line monitoring, quality control, and testing.

The IDAC-8 features a high-level language which affords tremendous savings in programming time for even the most complex, real-time task.

680/I A data communications system that can concentrate up to 128 low-speed teleprinter lines into one or more medium-speed channels, drastically reducing the charges for telephone lines. The user may have local or remote connection to other computer systems.

The 680/I can also serve as a message switcher, receiving messages, storing them until the outgoing circuit is available, and then forwarding them to their destination.

LAB-8™ A signal-averaging system designed for the researcher. It allows him to monitor his experiment as it progresses, detect new trends as they emerge, and change the direction of the experiment as the need arises. It provides instantaneous data reduction and analysis.

TSS-8™ A small computer multi-language time-sharing system designed to accommodate up to 16 users. All users have access to the full power of the computer and the use of all peripherals. The TSS-8 has a comprehensive program package that includes FORTRAN, ALGOL, BASIC-8, and FOCAL (an easy-to-learn conversational programming language developed by Digital).

TYPESET-8™ A typesetting system for the newspaper and publishing industry. It performs hyphenating, word spacing, and letter spacing to provide clean, justified lines of type. Typeset-8 sets news or copy at a rate of 12,000 lines per hour, and sets display ads at 10,000 lines per hour.

GLC-8™ The GLC-8 is a computerised system for automating the gas-liquid chromatography laboratory. With this system, the tedious task of measuring strip-chart recordings is eliminated, analysis becomes very easy to reproduce, and the result of each analysis is available in a typed report within seconds rather than hours.

PHA-8, PHA-12, PHA-15 Digital's Pulse Height Analyzers are fully integrated systems designed for use with the most advanced nuclear solid-state detectors and analogue-to-digital converters. Eleven computer-based PHA systems are offered, combining standard interfaces with proven application programs.

RAD-8 RAD-8 is a turnkey system used by hospital radiotherapists for planning X or gamma irradiation of cancerous tissue. RAD-8 replaces a tedious, time-consuming, inaccurate process with a fast, efficient, and highly accurate one.

FOCAL-8 FOCAL-8 is a conversational system that spans the gap between desk top calculators and time-shared terminals. A novice can learn to use FOCAL-8 in a few minutes and learn to program in a few hours. Table generation, line plots, and even complex integral equations are easily performed.

CLINICAL LAB-12 A PDP-12-based clinical laboratory system designed to provide an economical and rapid means of data collection, data reduction, and analysis. The system monitors laboratory instruments, processes and analyses data from these instruments, provides a summary patient file, and produces easy-to-read reports. The system is designed to be run in the hospital laboratory by existing laboratory personnel.

EDUCATIONAL SYSTEMS Several PDP computer-based systems are available. These systems train students in computer technology, assist in teaching mathematics and the sciences, and are used as vocational training tools and powerful problem-solving calculators.

GRAPHIC SYSTEMS A variety of computer-based graphic display systems is available for applications where the speed and the flexibility of graphic communications are needed to increase efficiency.

BUSINESS ORIENTED SYSTEMS
DIBOL™ is a complete business-oriented software system. It allows, for the first time, a relatively inexperienced programmer to produce complete business applications on a small computer. The small business can now use the power of a PDP-8 family computer efficiently and economically to construct programs for billing, accounts receivable, inventory control, payroll, general ledger, etc.

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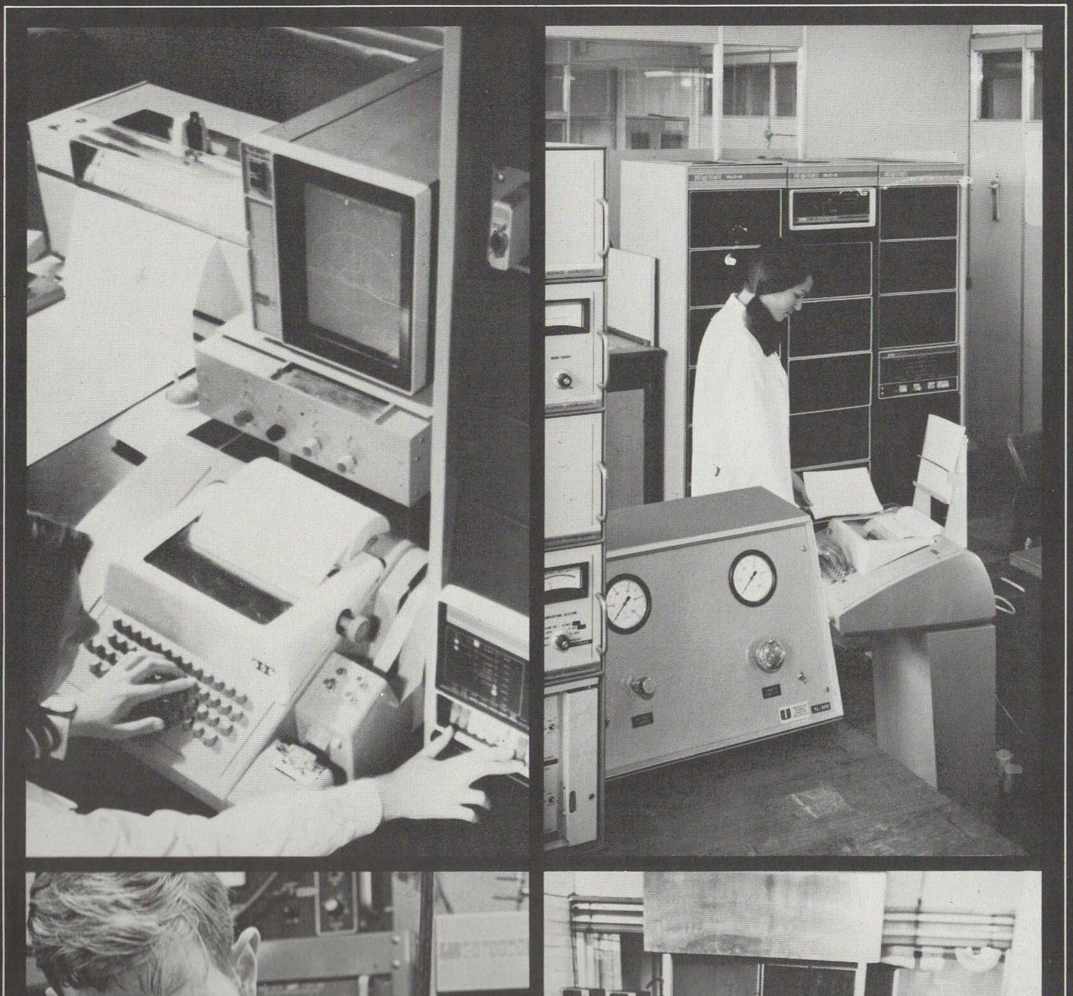

pdp-10

The PDP-10 is a versatile computer system designed to perform conversational time-sharing, local and remote batch processing, and real-time operations equally well and simultaneously. A PDP-10 system can perform any or all of these tasks, responding to individual user requirements.

In conversational time-sharing, up to 127 users at local or remote terminals can simultaneously share a broad range of system capabilities. Using a choice of several languages, a user can develop a program on his remote console and receive answers to mathematical or engineering problems in seconds.

A batch processing system is also available for high job throughput and for jobs which do not require immediate processing. Jobs submitted to the batch processor are spooled to disk, executed, and spooled from disk concurrently with time-sharing and real-time tasks.

Remote job-entry batch terminals are also available. PDP-8 family computers with teletype terminals, a card reader, and a line printer can be connected via highspeed telephone line to the PDP-10 system to provide the power of PDP-10 batch processing at remote sites.

Real-time operations such as data acquisition and control may be the primary purpose of a PDP-10. Real-time system software and hardware assure the real-time user of attention when he needs it, and allow conversational time-sharing and batch processing as well.

The PDP-10 offers FORTRAN IV, MACRO-10, COBOL, BASIC, AID, EDITOR, TECO, DDT, BATCH, PIP, and many other utility and library programs. ALGOL is under development. Any mixture of these languages and programs may be used concurrently under the supervision of the monitor. Most of these programs are re-entrant — that is, simultaneously shared by the users for better efficiency.

The PDP-10 also offers a wide variety of on-line bulk storage media, including a range of drums, disk packs, and magnetic tape transports. The monitor system guarantees that users' programs and data receive both hardware and software protection to insure privacy and prevent the accidental loss of information.

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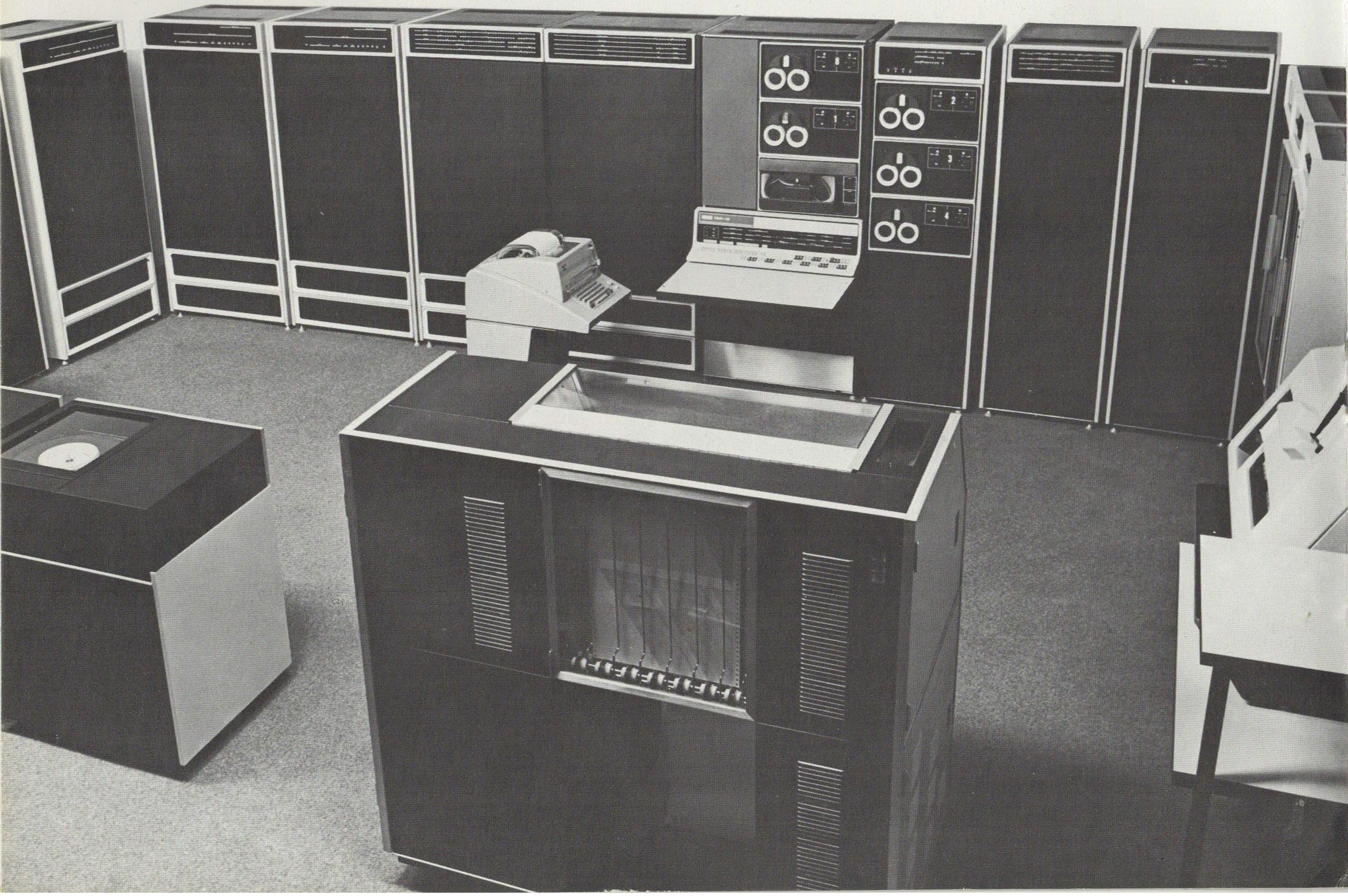

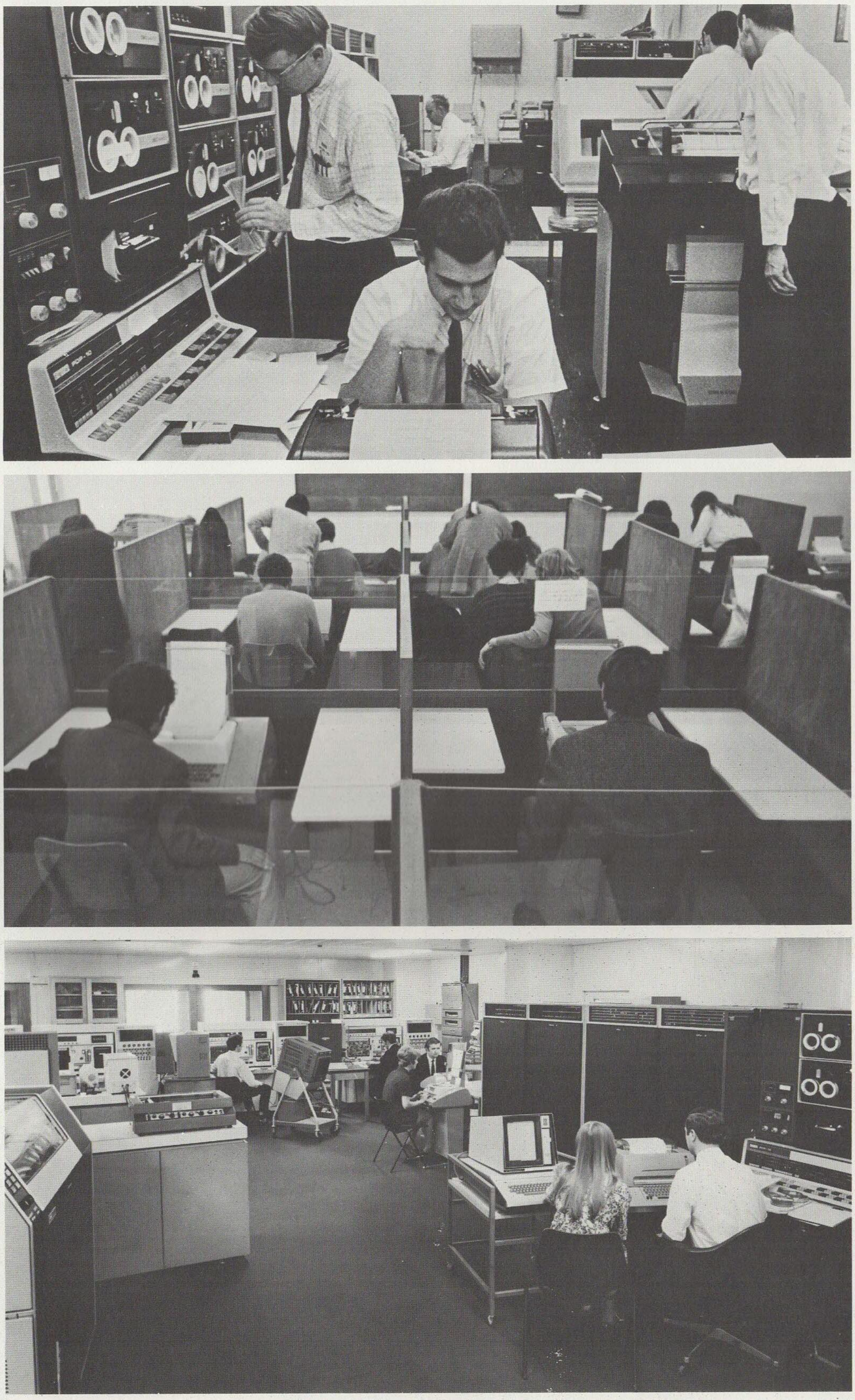
PDP-10

CONTROL PRODUCTS

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Modules Digital's logic modules —solid state, electronic circuit boards-- are used extensively by manufacturers of other equipment, from machine tools to scientific instruments. Digital's computers and associated equipment are also constructed from them.

Digital makes more than 300 standard logic modules in three major families:

K-Series: for control of machines, processes, and instruments in environments requiring immunity to noise.
M-Series: for high-speed computer interfacing and instrumentation.
A-Series: analogue-to-digital and digital-to-analogue converters.

The modules are used for interfacing other equipment to Digital computing systems, and for constructing a wide variety of laboratory equipment that need not be associated with the computing system.

Repetitive Control The PDP-14 is a solid-state replacement for electro-mechanical relays used in control of sequential production machinery.

The PDP-14 will directly control repetitive machines such as automotive transfer lines, complex material handling systems, steel rolling mills, and elevator systems. A number of PDP-14's, each controlling a process, may be monitored by a PDP-8 family computer for retrieval of product data and management information.

The PDP-14/L is the smaller, lower-cost version of the PDP-14.

Numerical Control MINI-DNC™, a direct numerical control system based on a PDP-8 family computer, is designed for the direct stepping-motor, open-loop control of one or two small 2½ axis machine tools. Point-to-point and circular interpolation are both available in the standard software package. Machine-side part programming is done through one or two Teletypes with an additional Teletype available for management reporting. Operators' consoles on the N.E.M.A. standard steel enclosure give maximum direct control over the machine operation.

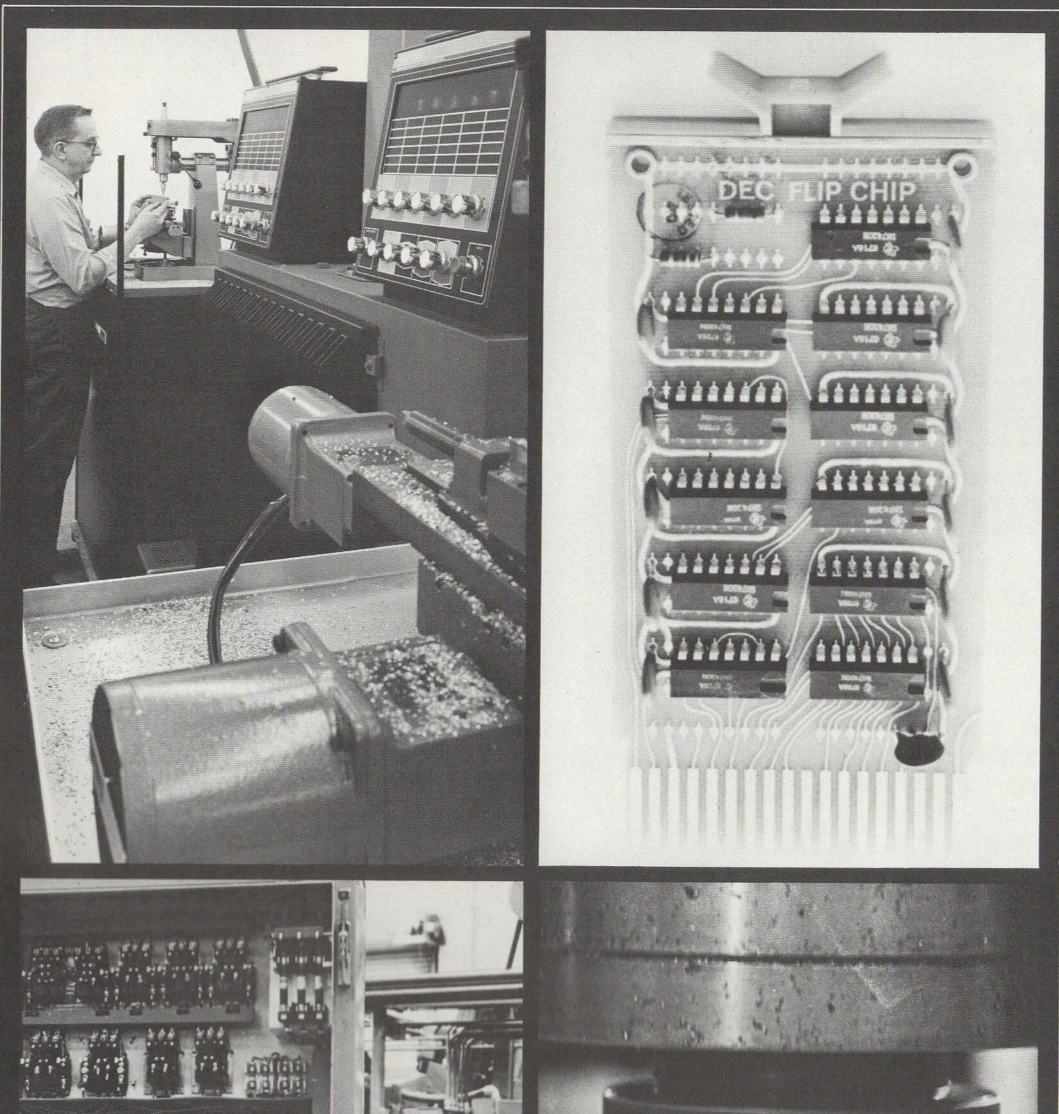
Quickpoint-8™ is a computer-based system for the preparation of tapes for numerically controlled, point-to-point machine tools. Simple commands, which describe the numerical control machine operation and co-ordinates, are fed into the system either alphanumerically through a Teletype keyboard or from punched tapes via the Teletype tape-reader.

Training/Testing Devices K-Series Logic Lab is a self-teaching Industrial Control Logic trainer, which may be used to help design and build control system prototypes and models.

Computer Lab is an education system for use in teaching digital logic and computer technology in universities and technical colleges. A complete year's study of logic techniques is described in the Computer Lab Workbook and Teachers Guide.

LAB-K is a complete kit of logic modules and mounting hardware designed as a programmable experiment controller for biomedical, pharmaceutical, and general life science research. LAB-K can also be interfaced to a PDP-8 family or PDP-12 computer for further data reduction.

WIRE WRAPPING SERVICE Digital's wire wrapping service provides low-cost, complete logic system wiring assemblies, guaranteed to customer specifications and warranted for workmanship. Plants are equipped with both fully- and semi-automatic wire wrapping machines, and with automatic wire-wrap testers. Most of this equipment was designed in-house, and is controlled by PDP-8 family computers.


DEC FLIP CHIP

PERIPHERALS

Digital offers a complete line of software-supported peripherals designed to match the performance capabilities of its computers whether large or small. For example, Digital was the first computer manufacturer to offer an 80-column line printer, providing a capability appropriate for small computers. Other trend-setting developments have been DECtape, low-cost, pocket-sized mag-tape reels; the DECwriter, a fast (30 characters per second), quiet, low-cost teletypewriter; the high-speed VTO6 alphanumeric terminal; and the low-cost, large capacity removable disk DECpack.

Digital's peripherals are efficient and economical because most are designed in-house, and manufactured in large volume.

All these factors give the customer great flexibility in system selection as evidenced by the range of peripherals available for each of Digital's major computers.

PDP-8 PERIPHERALS

Paper tape reader and punch
Optical mark card reader/punch
12- or 30-inch incremental plotter
32K- or 256K-word fixed-head disk
Single or dual DECtape transport
Storage tube display
Point plot display
Analogue-to-digital conversion system, up to 32 channels
Digital-to-analogue conversion system, up to 6 channels
10-bit analogue-to-digital converter
Industry-compatible magnetic tape transport
Line printer: 80 or 132 characters per line
Real-time clock
Double precision arithmetic
Read only memory, 256 and 1024 words
Parity check
Power fail
Bootstrap loader
Floating point hardware
30 cps DECwriter/teletypewriter
600K- or 1200K-word disk cartridge unit
Extended Arithmetic Element
Pushdown list
Hardware priority interrupt
Direct memory access

PDP-11 PERIPHERALS

Single or dual DECtape transport
Industry-compatible magnetic tape transport
64K- or 256K-word fixed-head disk
600K- or 1200K-word disk cartridge unit
High-speed memory
Hardware multiply/divide/shift/normalise
Real-time clock
CRT visual display with keyboard
Oscilloscope display
Storage tube display
Line printer: 80 or 132 characters per line
Paper tape reader and punch
Card reader
Analogue-to-digital and digital-to-analogue converter
Generalised 16-bit interface
30 cps DECwriter/teletypewriter

PDP-12 PERIPHERALS

Floating point processor
32K- or 256K-word fixed-head disk
830K word removable cartridge disk unit
LINCtape transport
DECtape/LINCtape format converter
Alphanumeric terminal
Paper tape reader and punch
7-inch × 9-inch CRT display
Incremental plotter
200cpm punch card reader
Line printer: 80 or 132 characters per line
Digital-to-analogue converter for up to 6 channels
16 channels 14.5 microseconds A/D conversion including differential preamps expandable to 32 channels
Time share option
Extended Arithmetic Element
Power fail/restart
32 channel data phone or teletype interface
Automatic priority interrupt
Real-time clock
30 cps DECwriter/teletypewriter
Industry-compatible magnetic tape

PDP-15 PERIPHERALS

Dual DECtape transport
Industry-compatible magnetic tape transport
256K-word fixed-head DECdisk
10 million-word disk pack drive unit
Interactive graphic display with light pen option
Real-time clock
Line printer: 80 or 132 characters per line
Card reader
Paper tape reader and punch
Digital-to-analogue and analogue-to-digital converters with multiplexers
Numerical I/O system
Data communications system
Extended Arithmetic Element
Automatic priority interrupt
Memory protection
Power fail
X-Y plotter
30 cps DECwriter/teletypewriter

PDP-10 PERIPHERALS

345,600-word fixed-head drum
5,196,800-word disk pack and drive
Dual DECtape unit
Magnetic tape control for data channel operation
7 and 9 channel industry-compatible magnetic tape unit
High-speed paper tape reader and punch
Card reader and punch
Line printers: 132 characters per line, 500, 600 or 1000 lines per minute
Plotters
Precision incremental and point plotting displays with character generation and light pen options
Character display terminals
Programmable real-time clock
Data communications systems
Remote batch terminals
30 cps DECwriter/teletypewriter

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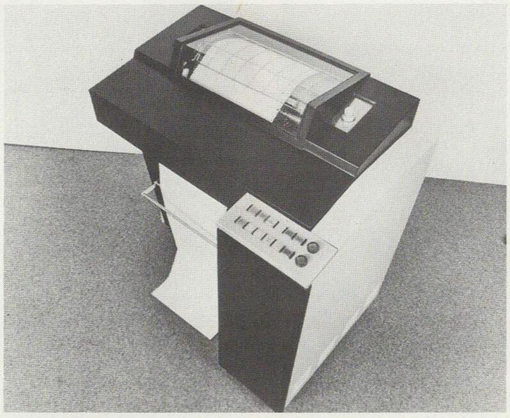
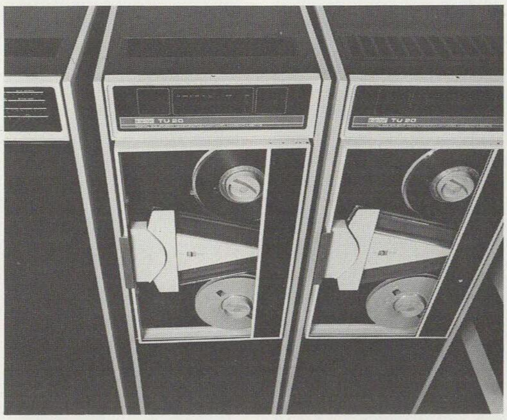
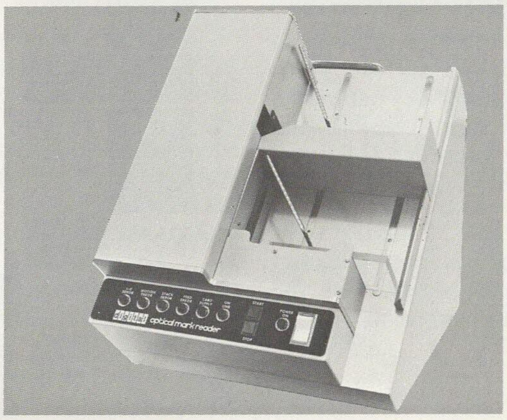
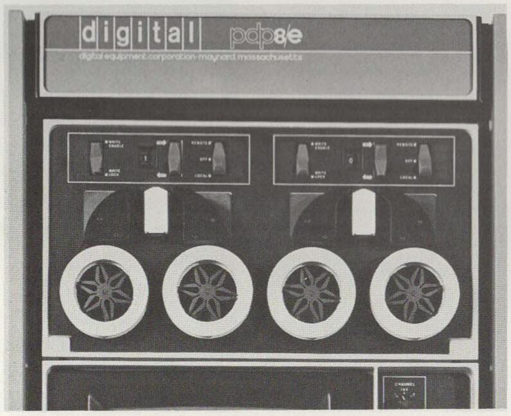
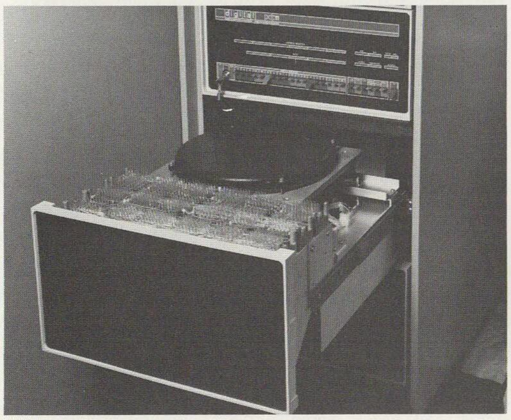




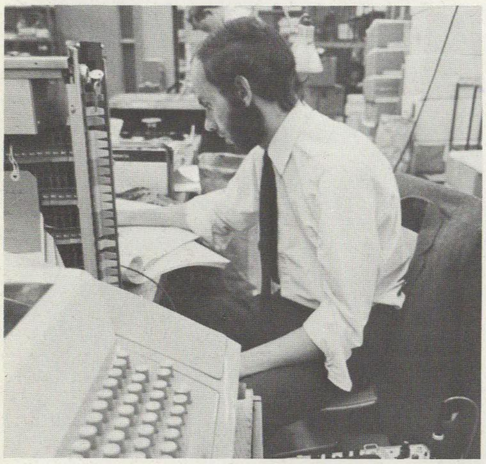






VT06 ALPHANUMERIC TERMINAL
COMPLETTELY INTERCHANGEABLE WITH TELETYPE
EIA RS-232B COMPATIBLE COMMUNICATIONS INTERFACE
TRANSMISSION SPEEDS OF UP TO 2400 BAUD
SPLIT SPEED CAPABILITIES
COMPLETE FULL DUPLEX OPERATION
72 CHARACTERS PER LINE
25 LINES
BLINKING CURSOR

SPECIAL HARDWARE AND SOFTWARE



Computer Special Systems The Computer Special Systems group interfaces Digital equipment to that of other manufacturers; designs new logic to apply the computer to a particular problem or process; and makes required modifications to any of Digital's existing products. The group is comprised of applications engineers who provide sales support and offer valuable assistance in configuring systems, as well as project engineers, programmers, and manufacturing specialists. The European group is located in Reading and Munich.

Custom Designed Software Digital has an in-house software group to provide comprehensive programming assistance to customers in almost any application area. It will also design and implement custom software, typically on a project basis.

Applications in which the group has expertise include process control, data communications, data reduction, information retrieval, biology, chemistry, numerical control, direct digital control, typesetting, simulation, financial analysis, commercial data processing, and special-purpose time-sharing.

MANUFACTURING

Digital is continually expanding its manufacturing facilities in Europe and North America in order to remain as responsive as possible to its large volume of customers. Current production space in excess of 1,500,000 square feet enables Digital to keep delivery time to a minimum.

In addition, in order to increase efficiency Digital uses over 200 computers internally to control manufacturing processes, run production equipment, and measure incoming and outgoing quality. The proportion of computers used for in-house purposes is one of the highest in the industry.

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Printed in Switzerland

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